

6. (Amended) A non-porous polyurethane film according to claim 1, wherein in the araliphatic diol, $k = 1$ and Y represents an isopropylidene group, while Q and X have the meaning of an H-atom and m and $n = 1$.

CF 7. (Amended) A non-porous polyurethane film according to claim 1, wherein in the araliphatic diol, $k = 1$ and Y represents an isopropylidene group, while Q has the meaning of a CH_3 -group and X has the meaning of an H-atom and m and $n = 1$.

8. (Amended) A non-porous polyurethane film according to claim 6, wherein the araliphatic diol is present in an amount of 1 to 8 wt.%.

REMARKS

Claims 1-8, 17-21 and 23-25 are pending here. By this Amendment, claims 1-8 are amended in an effort to address the Examiner's concerns regarding the claims with respect to the requirements of 35 U.S.C. §112, first and second paragraphs. No new matter is added.

The attached Appendix includes a marked-up copy of the rewritten claim (37 C.F.R. §1.121(c)(1)(ii)).

Applicants appreciate the courtesies shown to applicants' representative by Examiner Sergeant in the February 11, 2003 interview. Applicants' separate record of the substance of the interview is incorporated into the following remarks.

I. Rejections Under 35 U.S.C. §112

A. 35 U.S.C. §112, First Paragraph

1. Molecular Weight

Claims 1-8, 17-21 and 23-25 were rejected by the Patent Office as allegedly containing subject matter that was not described in the specification in such a way as to enable one skilled in the art to which it pertains to make and/or use the invention. The rejection is respectfully traversed.

The Patent Office alleges that the claims fail to specify whether the molecular weight for the polyethylene oxide glycol is a weight average or number average molecular weight.

Attached to this Amendment is an article on molecular weight determination from the Encyclopedia of Polymer Science and Technology (1968). As clearly set forth in this excerpt, the number average molecular weight is suitable for cases where an analytical expression for the moles of a molecule $f(M)$ is known, which is the case for polyethylene oxide glycol. In view of this, it is quite clear that a practitioner in the art, understanding that the number average molecular weight is used when the analytical structure is known and that the analytical structure is known for polyethylene oxide glycol, would understand the specification and claims of the present application to refer to a number average molecular weight. Accordingly, one of ordinary skill in the art would have been enabled to practice the present invention without undue experimentation.

Applicants note that the foregoing is confirmed by the fact that the two Japanese applications referenced in the specification, JP 55-54320 and JP 4-45117 (English-language translations attached), similarly refer simply to "molecular weight." Such confirms that practitioners in the art are not confused by such a description of the molecular weight, but in fact understand its meaning readily and can therefore readily practice the inventions without undue experimentation.

Finally, applicants submit that even if the term "molecular weight" required the practitioner in the art to do some experimentation to determine the appropriate molecular weight, which it does not as discussed above, such practitioner would still be able to practice the invention without undue experimentation. The Patent Office has failed to establish how running two experiments (one for each different molecular weight) to confirm the molecular weight could constitute undue experimentation that prevents the practice of the invention altogether.

In view of the foregoing, applicants respectfully submit that claims 1-8, 17-21 and 23-25 fully comply with the requirements of 35 U.S.C. §112, first paragraph. Reconsideration and withdrawal of the rejection are respectfully requested.

2. Derived Components

The Patent Office next rejected claims 1-8, 17-21 and 23-25 under 35 U.S.C. §112, first paragraph as allegedly not being supported by an adequate written description. This rejection is respectfully traversed.

In the Office Action, the Patent Office asserted that the specification failed to adequately describe the production of the components derived from the starting materials. Applicants respectfully disagree. In particular, the specification clearly explains that the polyurethane includes a polyether glycol component, a polyisocyanate component and a chain extender component, and then continues to explain that this polyurethane is derived from a reaction composition comprised of polyethylene oxide glycol (responsible for formation of the polyether glycol), 4,4'-diphenyl methane diisocyanate (responsible for formation of the isocyanate component), and 1,4-butane diol and an araliphatic diol of a specified formula (responsible for formation of the chain extender). See, for example, page 2, lines 1-21, page 5, line 19 to page 7, line 11, Example I (page 10, lines 5-19) and Example III (page 11, line 11 to page 12, line 6) of the specification, wherein the components of the reaction composition and end components of the polyurethane derived via the reaction are explained, and the reaction is set forth.

In view of the foregoing, applicants respectfully submit that the specification adequately describes the polyurethane and components thereof derived from the starting materials. Thus, the claims here again comply with the requirements of 35 U.S.C. §112, first paragraph. Reconsideration and withdrawal of this rejection are respectfully requested.

B. 35 U.S.C. §112, Second Paragraph

Claims 1-8, 17-21 and 23-25 were rejected by the Patent Office under 35 U.S.C. §112, second paragraph as allegedly being indefinite. The rejection is respectfully traversed.

The Patent Office alleged that the use of the terms "comprises" and "comprising" to specify the weight contents was confusing. The Patent Office also alleged that the language "derived from a starting material of ..." was indefinite.

Applicants submit that there was no ambiguity in the claim language. In particular, taking the polyether as an example, it was clear that after reaction with the isocyanate, the polyethylene oxide glycol $[H(OCH_2CH_2)_nOH]$ is converted to the polyether glycol structure $[-(O-CH_2-CH_2-)_n-O-]$ that forms a part of the polyurethane. The polyethylene oxide glycol structure served as the calculation basis in order to determine the amount in the starting composition. Thus, the claim recited the weight percent values of all of the reactants as calculated based on the components in their starting form. That is, the starting composition comprises 40 to 52 wt.% of polyethylene oxide glycol, 30 to 45 wt.% of 4,4'-diphenyl methane diisocyanate, 0.5 to 10 wt.% araliphatic diol and 5 to 20 wt.% of 1,4-butane diol plus the araliphatic diol.

In an effort to expedite prosecution of the application, claim 1 has been amended to clarify the recitation of the weight percentages as referring to the amount of the components in the starting reaction composition as discussed above.

Finally, the Patent Office requested that ratios be restated to include a ":1" after the recited ratio. By this Amendment, claim 1 has been accordingly amended.

In view of the foregoing amendments, applicants submit that claims 1-8, 17-21 and 23-25 fully comply with the requirements of 35 U.S.C. §112, second paragraph.

Reconsideration and withdrawal of the rejection are respectfully requested.

II. Additional Interview Issue

During the interview, the Examiner requested that a brief explanation of the language in claim 1 regarding component a) be provided on the record. Claim 1 presently recites for component a):

- a) 40 to 52 wt.% of a total weight of the composition of polyethylene oxide glycol having an average molecular weight of 800 to 4000 and an atomic ratio of carbon to oxygen in the range of 2.0:1 to 4.3:1, with the proviso that at least 30 wt.% of the polyurethane is composed of a polyether glycol having an atomic ratio of carbon to oxygen in the range of 2.0:1 to 2.4:1.

As explained at the interview, the proviso clause refers to the amount of polyether glycol units, present in the polyurethane, which must have a carbon to oxygen atomic ratio of 2.0:1 to 2.4:1. That is, in the reacted polyurethane, at least 30 wt.% of the polyurethane must be comprised of polyether glycol units having an atomic ratio of carbon to oxygen within the recited range of 2.0:1 to 2.4:1.

The "at least 30 wt.%" value in the proviso clause does not create incongruity with the range (40 to 52 wt.%) of the polyethylene oxide glycol in the starting composition from which the polyurethane is made. The proviso does not define all of the polyether glycol units in the end polyurethane chain, just the minimum amount that must have the more specific carbon to oxygen atomic ratio. Thus, the amount of polyether glycol units is not limited to only about 30 wt.% of the polyurethane. Rather, other polyether glycol units having atomic ratios of carbon to oxygen outside the range recited in the proviso may also be present in the polyurethane.

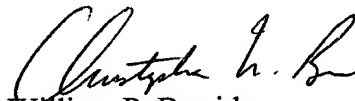
Applicants believe the foregoing additional explanation should satisfy the explanation requested by the Examiner.

III. Conclusion

In view of the foregoing amendments and remarks, applicants submit that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-8, 17-21 and 23-25 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in better condition for allowance, the Examiner is invited to contact applicants' undersigned representative at the telephone number listed below.

Respectfully submitted,



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Attachments:

Appendix
Encyclopedia of Polymer Science and Technology excerpt
Two English-language translations of JP applications

Date: February 14, 2003

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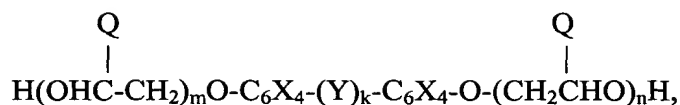


APPENDIX

Changes to Claims:

The following is a marked-up version of the amended claim(s):

1. (Twice Amended) Non-porous, waterproof film having a water vapor-
~~vapour~~ permeability of at least 1000 g/m² day in accordance with ASTM E96-66 (Procedure
B), with the proviso that the water temperature is kept at 30°C, while the ambient temperature
is 21°C at 60% RH, comprising a thermoplastic polyurethane composed of a polyether glycol,
a polyisocyanate, and a chain extender, at a ratio of NCO to active hydrogen atom of 0.9:1 to
1.2:1, wherein the polyurethane is a reaction product of a composition comprising ~~composed~~
of
 - a) 40 to 52 wt.% of a total weight of the composition of polyether glycol, derived
~~from a starting material of polyethylene oxide glycol comprising 40 to 52~~
~~wt.% of a total weight of reactants~~, having an average molecular weight of 800
to 4000 and an atomic ratio of carbon to oxygen in the range of 2.0:1 to 4.3:1,
with the proviso that at least 30 wt.% of the polyurethane is composed of a
polyether glycol having an atomic ratio of carbon to oxygen in the range of
2.0:1 to 2.4:1,
 - b) 30 to 45 wt.% of the total weight of the composition of polyisocyanate,
~~derived from a starting material of 4,4'-diphenyl methane diisocyanate-~~
~~comprising 30 to 45 wt.% of the total weight of reactants~~, and
 - c) 5 to 20 wt.% of 1,4-butane diol a chain extender and an araliphatic diol,
wherein the araliphatic diol comprises 0.5 to 10 wt.% of the composition and
has of the formula



wherein $k = 0$ or 1 , where if $k = 1$, Y stands for a methylene or isopropylidene group, Q has the meaning of an H-atom or a CH_3 -group, C_6X_4 has the meaning of a phenylene group wherein X is hydrogen or a chlorine or bromine atom, and m and n is the same or different and stand for an integer ≥ 1 , with $m + n \leq 10$,

~~wherein the chain extender is derived from a starting material of 1,4-butane diol, and wherein a total amount of 1,4-butane diol and araliphatic diol comprises 5 to 20 wt.% of the weight of the reactants such that the araliphatic diol comprises 0.5 to 10 wt.% of the total weight of the reactants,~~

wherein a) is not c).

2. (Amended) A non-porous polyurethane film according to claim 1, wherein ~~characterised in that~~ the molecular weight of the polyethylene oxide polyether glycol is in the range of 1000 to 3000.

3. (Amended) A non-porous polyurethane film according to claim 1, wherein ~~characterised in that~~ the weight percentage of polyethylene oxide glycol polyether glycol is in the range of 41 to 50.

4. (Amended) A non-porous polyurethane film according to claim 1, wherein ~~characterised in that~~ the weight percentage of polyisocyanate, calculated as 4,4'-diphenyl methane diisocyanate, is in the range of 35 to 42 wt.%.

5. (Amended) A non-porous polyurethane film according to claim 1, wherein ~~characterised in that the polyether glycol is composed wholly of polyethylene oxide glycol~~ has having an average molecular weight of about 2000.

6. (Amended) A non-porous polyurethane film according to claim 1, wherein ~~characterised in that~~ in the araliphatic diol, $k = 1$ and Y represents an isopropylidene group, while Q and X have the meaning of an H-atom and m and n = 1.

7. (Amended) A non-porous polyurethane film according to claim 1, wherein ~~characterised in that~~ in the araliphatic diol, $k = 1$ and Y represents an isopropylidene group, while Q has the meaning of a CH_3 -group and X has the meaning of an H-atom and m and n = 1.

8. (Amended) A non-porous polyurethane film according to claim 6, wherein ~~characterised in that~~ the araliphatic diol is present in an amount of 1 to 8 wt.%.